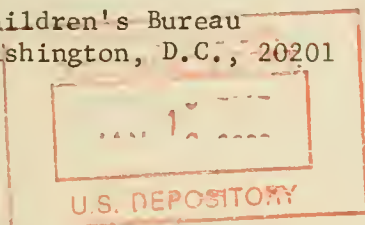


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U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
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RUBELLA

Rubella, commonly known as German measles, and occasionally also referred to as the "three day measles," is an infectious disease caused by a virus. Because it is usually a very mild disease, and because complications are not common, this disease received little attention until 1941, when its occurrence in pregnant women was linked to the development of congenital malformations in their babies. Following an epidemic of rubella in Australia, Dr. N. M. Gregg, an eye specialist, noticed a high incidence of cataracts and other anomalies in infants born to mothers who had the disease early in pregnancy. Since this brilliant observation, the harmful effect of rubella on fetuses has been well established. Thus, a disease hitherto considered as rather innocuous suddenly gained recognition as one of the greatest threats to pregnant women. Recently, rubella attracted attention because of the large number of babies with congenital abnormalities born to mothers infected in the nation-wide epidemic which started on the East Coast in 1963.

Although commonly referred to as a childhood disease, rubella occurs with some frequency in adolescents and adults. Its incidence among adults is higher than that of measles or chickenpox. Like these diseases, a single attack provides long lasting protection, and a second infection almost never occurs. After a person is exposed to the disease, it generally takes from 2 to 3 weeks for symptoms to develop. This silent interval after exposure is known as the incubation period. A person is capable of spreading the disease even before he has any symptoms, i.e., in the incubation period; and he remains contagious for several days after the onset of symptoms. The difficulty of controlling the spread of such a disease is readily apparent, since exposure of susceptible persons often takes place without anyone's knowledge.

Typically, rubella has a relatively mild course. In children, the appearance of a rash may be the first sign of the illness noticed by parents. The rash starts on the face and spreads rapidly down the body and limbs, usually lasting about 3 days, hence the name "3-day measles." It may disappear before the third day, and occasionally, rubella occurs

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without any rash at all. The appearance of the rash varies, and may resemble measles, scarlet fever, roseola, other viral diseases such as the Echo virus and Coxsackie virus infections and rash caused by allergy. Low grade fever is usually present with the rash. Swelling of the lymph glands behind the ears, in the neck, and near the posterior prominent part of the head generally precedes the onset of rash by a few to several days. At the beginning, these glands are painful when touched, but pain usually subsides in a day or two, while the swelling persists a little longer. Other symptoms such as general malaise or ill-being, headache, loss of appetite, sore throat, inflammation of the eyes, are more common in adolescents and adults than in children.

Complications of rubella, though less common than in measles, have been reported with increased frequency in the recent epidemic. Arthritis, bleeding tendency generally evidenced by bluish or purplish spots and blotches on the skin, and encephalitis have all been described.

The importance of rubella lies in its damaging effect on the fetus when a pregnant woman contracts the disease early in pregnancy. The first 3 months of pregnancy is the most dangerous period, but there is evidence that the fetus may also be affected when rubella occurs shortly after this period. There are several possible outcomes of a rubella-complicated pregnancy. It may terminate in spontaneous miscarriage, or premature labor, in delivery of a stillborn baby, in delivery at full term of a malnourished baby, or of an affected infant with various types of anomalies, and in the birth of a normal infant. The exact incidence of affected infants born after a rubella-complicated pregnancy is not known, though it is generally agreed that the earlier the infection, the higher the incidence. From previous epidemics, it has been estimated that about 10-20% of infants born to mothers infected in the first 3 months of pregnancy will have some kind of malformations. The incidence is much higher if the mother is infected in the first month of pregnancy. Multiple anomalies, i.e., infants with more than one anomaly, are also more common when rubella occurs in the first 2 months.

The term "rubella syndrome" refers to the various congenital anomalies which may be present, either singly or in combination, in infants born of a pregnancy complicated by rubella. Until the recent epidemic, the main categories of anomalies are generally included in the rubella syndrome:

1. Hearing loss in one or both ears, and of varying degree. Often it is not detected at birth, and sometimes not until a child reaches school age.
2. Eye defects such as cataracts, glaucoma and squint, and unusually small size of the eyeball.
3. Heart defects, which also may not be apparent at birth.

4. Anomalies of the Central Nervous System, the most common of which are abnormally small size of the head and mental retardation.

Following the 1963-1964 rubella epidemic in the United States, many affected infants were born who presented features not usually included in the rubella syndrome. These are:

1. Small size at birth despite a full term pregnancy. Many of these infants have a birth weight below 5 pounds. An infant born at term weighing as little as 2 pounds 2 ounces was reported. After birth many of these infants gain weight very poorly.
2. Bleeding tendency, manifested in infants as bluish or purplish spots scattered over the entire body, particularly over the face. This is associated with decreased number of blood platelets -- a blood element essential in the process of blood clotting.
3. Enlarged liver and spleen.
4. Jaundice.
5. Evidence of inflammation of the brain and spinal cord, as indicated by a full fontanel and abnormal spinal fluid.
6. Lesions which involve bones of the limbs (arms and legs) detectable only by X-ray.

Infants born of mothers infected with rubella during pregnancy apparently are infected with the virus also. At birth, and for several weeks thereafter, for even a year -- rubella virus has been detected in the throat, urine and feces of these infants. These infants are thus capable of spreading the infection, and there have been reports of doctors and nurses who developed rubella after caring for them.

The diagnosis of rubella based on symptoms of the disease is met with many pitfalls. As mentioned earlier, the rubella rash is often confused with rashes seen in other infectious diseases; besides, there may be no rash at all. Swollen tender glands in the locations described above are highly suggestive of rubella, yet taken alone, cannot be used to diagnose rubella with certainty. Furthermore, so called "subclinical infection" can take place with minimal or no apparent symptoms. A positive diagnosis must therefore depend on either isolation of the rubella virus from the throat or other body tissues of the patient, or on blood tests. While isolation of the virus probably indicates a relatively recent infection, a single positive blood test only means that a person has been infected with the rubella virus some time in her life. To determine whether the infection is recent or

not, doctors make two blood tests. Usually, one blood specimen is taken as soon as a person is exposed to rubella, or if exposure is not known, as soon as symptoms suggestive of rubella appear. A second specimen is taken two or more weeks later. A significant difference in the two blood tests indicates that the infection is recent.

Although not yet widely available, newly developed laboratory techniques have made it possible to obtain the results of blood tests within several hours, instead of the two weeks now required.

Unless complications occur, rubella rarely requires treatment. Deliberate exposure of girls to rubella before they reach the childbearing age has been advocated by many. However, this carries with it the danger of spreading the infection through these girls to their mothers or other close contacts who may be pregnant.

If a woman has been, or is thought to have been, infected with rubella in early pregnancy, usually she is given an injection of gamma globulin as soon as possible. This provides temporary protection against the infection. Although it prevents German measles, it is not yet known if it will insure a normal baby. Some research suggests that it may only suppress the symptoms without preventing the infection which can cause damage in the infant. Many scientists believe that convalescent gamma globulin (prepared from blood of a person convalescing from the disease and much higher in potency) may afford better protection than gamma globulin prepared from other sources.

During the epidemics of the past few years, which have resulted in possibly 20,000 deformed babies, some couples, unwilling to face the risk of bearing a malformed child, requested and received termination of pregnancy. But for religious, legal, medical and other reasons, such an act may be impossible or not acceptable to a great many more persons.

Although to date no effective treatment of a pregnant woman infected with rubella early in pregnancy can insure that her baby will be born normal, recently the picture became more hopeful. The virus of rubella was isolated. That is the first step toward developing immunization against the disease. When developed, such a vaccine -- similar to that against measles and polio -- will be used to vaccinate girls before they reach the childbearing age. Thus they will be safeguarded against rubella.

Infants born after a pregnancy complicated by rubella should be carefully examined at birth for possible congenital malformations. Since some of these infants are capable of spreading the infection, isolation has been recommended. Regular follow-up examinations are indispensable even in infants apparently normal at birth, because certain defects like partial hearing loss and mental retardation may not become evident until later. For many of the congenital malformations, such as cataracts, glaucoma, and congenital heart defects, surgery is now possible. Early diagnosis, treatment and rehabilitation will improve the outlook for many infants born with the "rubella syndrome."